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Analysis of agricultural sector adaptability through climate forecasting in a climate-crop-agricultural sector model

H. S. Choi (1,2), U. Schneider (1), E. Schmid (3), and H. Held (1)

(1) Research Unit Sustainability and Global Change, University of Hamburg, Hamburg, Germany (hyung.choi@zmaw.de), (2) International Max Planck Research School on Earth System Modelling, Hamburg, Germany, (3) Institute for Sustainable Economic Development, University of Natural Resources and Applied Life Sciences, Vienna, Austria

Under a changing climate, an increased frequency and severity of extreme weather events could impose greater damages to the agricultural sector than projected shifts of mean climate. However, existing integrated assessment models do not adequately capture the economic consequences of extreme events in the agricultural sector.

As a first step towards a more adequate model, we develop a stochastic climate-crop-agricultural sector model and assess the economic consequences of climate impacts on aggregated producer decisions in Spain. We also compare agricultural sector impacts with and without annual climate forecasting.

The value of seasonal forecasting is assessed with a crop mix adaptation option in Spain, where drought conditions are prevalent. Yield impacts of climate are simulated for six crops (wheat, barely, cotton, potato, corn and rice) with the EPIC (Environmental Policy Integrated Climate) model. Daily weather data over the period 1961 to 1990 are taken from the regional climate model REMO and used as reference period for exploring the effects of interannul variability and subsequent adaptation measures. Climate information and its consequent yield variability information are given to the stochastic agricultural sector model to calculate the value of climate information in the agricultural market.

While consumers of agricultural products always benefit from seasonal forecasting, the value of information to producers is highly sensitive to farmers' crop mix choices.